

The water sample analyzed from this water body exceeded a threshold cyanobacteria level and consequently produced a SeSCRIPT Cyanobacteria Alert (Table 1). This SeSCRIPT Alert Index highlights potential risks associated with toxic cyanobacteria and provides general management options for consideration.

Table 1. Alert levels of cyanobacteria in freshwaters (modified from World Health Organization 1999).

SeSCRIPT* ALERT INDEX	EXPOSURE RISK	CYANOBACTERIA LEVELS (cells/mL)	POTENTIAL EXPOSURE RISKS
★	Low	< 20,000	Although cyanobacteria may currently be at low levels, presence is an indicator the water body may support conditions that could fuel levels of health concern for animals and humans.
★★★	Moderate	20,000 - 100,000	Moderate probability of short-term adverse health outcomes (skin irritations, gastrointestinal illness). Potential for long-term illness with chronic exposures.
★★★★	High	>100,000	High probability of short-term adverse health outcomes (skin irritations, gastrointestinal illness). Potential for long-term illness with chronic exposures.
★★★★★	Extreme	>100,000 with scums/mats	High potential for significant respiratory, gastrointestinal and neurological impacts. Potential for acute poisonings. Potential for long-term illness with chronic exposures.

Cyanobacteria Facts

Cyanobacteria, also known as blue-green algae, are readily present in freshwaters throughout the United States. Cyanobacteria blooms often appear as bluish-green surface scums or thick mats (Images 1 and 2), although some infestations are dispersed through the water and provide slight discoloration (Image 3). With rapid growth rates under certain conditions, these organisms have the ability to achieve levels of concern in short order. Some cyanobacteria have the ability to form surface scums through buoyancy regulation and become highly concentrated in static or windblown areas of water bodies. Caution should be taken around cyanobacteria infestations to avoid exposure and resultant potential health risks.



Image 1. Cyanobacteria scum



Image 2. Cyanobacteria mat

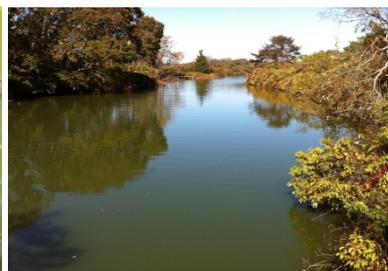


Image 3. Discolored water

Cyanobacteria Impacts

Cyanobacteria are capable of producing toxins that can pose significant risks to humans and wildlife. Common cyanobacteria associated toxins includes; hepatotoxins (impacts liver/kidney), neurotoxins (impacts brain), dermatitis toxins (impacts skin, digestive system) and gastrointestinal toxins (impacts digestive system). Animal mortalities from cyanobacteria toxin exposure have, in part, included: cows, dogs, pigs, and ducks (Cook et al. 1989; Mez et al. 1997; Wood et al. 2007). Human exposure is commonly from inhalation of aerosolized toxins, ingestion/consumption of contaminated water/ algae cells, or recreational skin contact with cyanobacteria infestations. A summary of toxins groups and exposure signs and symptoms is presented in Table 2. Correlations have been made between chronic cyanotoxin exposure and neurodegenerative diseases, such as ALS and Alzheimer’s (Bradley & Mash 2009), and human mortalities have been observed (Carmichael 2001) in extreme exposure scenarios.

Table 2. Partial summary of cyanobacteria toxin types and associated exposure signs and symptoms (modified Codd et al. 1999; WHO 1999; Graham 2007, Jewet et al. 2008).

Toxin Group	Toxin Name	Exposure Signs & Symptoms
Hepatotoxins (liver/kidney)	Microcystins Nodularins Cylindrospermopsin	Numbness of lips, tingling in fingers/toes, dizziness, headache, diarrhea, jaundice, shock, abdominal pain/distention, weakness, nausea/vomiting, severe thirst, rapid/weak pulse, acute pneumonia
Neurotoxins (brain)	Anatoxins Saxitoxins β -Methylamino-L-alanine	Tingling, burning, numbness, drowsiness, incoherent speech, paralysis, weakness, staggering, convulsions, difficulty in breathing, vomiting, muscle twitching, gasping, backward arching of neck in birds, and death
Dermatitis/Gastrointestinal toxins (skin/digestive)	Aplysiatoxins Lipopolysaccharides Lyngbyatoxin	Rash, redness, burning, skin irritation, acute dermatitis, hives, blisters, abdominal pain, vomiting, diarrhea

Cyanobacteria Management

Even if toxins are not at detectable levels, we cannot conclusively say there are no risks associated with cyanobacteria infestations due to, 1) the continued discoveries of new toxins and other secondary metabolites and consequent lack of knowledge regarding their toxicological effects or analytical detection, and 2) the production of toxins is intermittent (some algae may not produce today, though may tomorrow or next week). Therefore, source control of the potential toxin producing culprits (i.e. cyanobacteria) is recommended to shut off the potential toxin source, remove the exposure and offset consequent risks. Management can be proactive (phosphorus management) to prevent further growth and/or reactive (algaecides). Management programs are developed on a site specific basis by incorporating characteristics of the algae (density, structure, location etc.), characteristics of the water (nutrient levels, hardness, pH etc.) and the designed formulation of solutions (phosphorus inactivation, copper formulation, surfactant presence, etc.). See the Treatment Guidance section of your SeSCRIPT report for a customized, site-specific management program and contact your SePRO Aquatic Specialist for additional assistance.

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